

WHAT IS CLAIMED IS:

1. A method of patterning a resist, comprising:
providing a patterned mask comprising at least one transparent region,
at least one partially transmissive region and at least one opaque region;

5 positioning the at least one transparent region of the mask over a first
area of the resist at which first features having a first aspect ratio are to be patterned,
the resist comprising a photopolymer;

positioning the at least one partially transmissive region of the mask
over a second area of the resist at which second features having a second aspect ratio
10 that is lower than the first aspect ratio are to be patterned;

emitting radiation onto and through the mask and onto a surface of the
resist so that (i) the first area of the resist is exposed by radiation passing through the
at least one transparent region of the mask, and (ii) the second area of the resist is
exposed by radiation passing through the at least one partially transmissive region of
15 the mask, wherein the mask controls the amount of radiation transmitted onto the
resist to be substantially uniform over substantially the entire portion of the surface of
the resist that is irradiated; and

developing the resist to pattern the first features at the first area and the
second features at the second area of the resist.

20 2. The method of claim 1, further comprising using the mask to control
the radiation transmitted onto the surface of the resist so that topographical differences
between the first area and the second area of the substrate following development of
the resist are from about 0.1 microns to about 5 microns.

3. The method of claim 1, wherein the resist has a thickness of from about
25 5 microns to about 500 microns.

4. The method of claim 1, wherein the first features have an aspect ratio
of from about 1:1 to about 5:1, and the second features have an aspect ratio that is no
more than about one-half of the aspect ratio of the first features.

5. The method of claim 1, wherein the first features and the second
30 features include features that have a width of from about 2 microns to about 3 cm.

6. The method of claim 1, wherein the at least one transparent region of
the mask has a transmittance of at least about 90%, and the at least one partially
transmissive region of the mask has a transmittance of from about 50% to about 90%.

7. The method of claim 6, wherein the at least one transparent region of the mask has a transmittance of about 100%, and the at least one partially transmissive region of the mask has a transmittance of from about 70% to about 80%.

8. The method of claim 1, wherein the mask comprises a plurality of the transparent regions and a plurality of the partially transmissive regions.

9. The method of claim 1, wherein the resist is a negative resist.

10. An ink jet print head comprising at least one resist patterned by the method of claim 1.

11. A micro electro-mechanical system comprising at least one resist patterned by the method of claim 1.

12. A method of making an ink jet print head, comprising:
 applying a resist comprising a photopolymer on a substrate;
 providing a patterned, multi-transmissive mask comprising at least one transparent region, at least one partially transmissive region and at least one opaque region;

positioning the mask between a radiation source and the resist;
 activating the radiation source so that radiation emitted from the radiation source is selectively transmitted by the at least one transparent region and the at least one partially transmissive region of the mask and impinges on a first area and a second area, respectively, of the resist, wherein the mask controls the amount of radiation transmitted onto the resist to be substantially uniform over substantially the entire portion of the surface of the resist that is irradiated; and

developing the resist to pattern first features at the first area and second features at the second area, the first features having a first aspect ratio and the second features having a second aspect ratio that is lower than the first aspect ratio.

13. The method of claim 12, wherein:
 the ink jet print head is a thermal ink jet print head;
 the substrate is a heater wafer; and
 the method further comprises mounting a cover plate on the patterned resist, the first features and the second features providing ink flow channels in the thermal ink jet print head.

14. The method of claim 12, wherein the surface of the patterned resist that is irradiated has topographical differences between the first area and the second area after developing of from about 0.1 micron to about 5 microns.

15. The method of claim 12, wherein the cover plate is mounted on the patterned resist without performing any post-patterning processing to a surface of the resist that is irradiated by the radiation source and faces the cover plate.

16. The method of claim 12, wherein the mask comprises a plurality of the transparent regions and a plurality of the partially transmissive regions.

17. The method of claim 12, wherein the resist is a negative resist.

18. A patterned resist formed by a method comprising:
providing a mask comprising at least one transparent region, at least one partially transmissive region and at least one opaque region;

positioning the at least one transparent region of the mask over a first area of a resist at which first features having a first aspect ratio are to be patterned, the resist comprising a photopolymer;

positioning the at least one partially transmissive region of the mask over a second area of the resist at which second features having a second aspect ratio lower than the first aspect ratio are to be patterned;

emitting radiation through the mask and onto the resist so that (i) the first area of the resist is exposed by radiation passing through the at least one transparent region of the mask, and (ii) the second area of the resist is exposed by radiation passing through the at least one partially transmissive region of the mask, wherein the mask controls the amount of radiation transmitted onto the resist to be substantially uniform over substantially the entire portion of the surface of the resist that is irradiated; and

developing the resist to pattern the first features at the first area and the second features at the second area of the resist.

19. The patterned resist of claim 18, wherein topographical differences between the first area and the second area of the resist obtained after the development of the resist are from about 0.1 microns to about 5 microns.

20. The patterned resist of claim 18, wherein the resist has a thickness of from about 5 microns to about 500 microns.

21. The patterned resist of claim 18, wherein the first features have an aspect ratio of from about 1:1 to about 5:1, and the second features have an aspect ratio that is no more than about one-half of the aspect ratio of the first features.

22. The patterned resist of claim 18, wherein the first features and the second features include features that have a width of from about 2 microns to about 3 cm.

5 23. The patterned resist of claim 18, wherein the mask comprises a plurality of the transparent regions and a plurality of the partially transmissive regions.

24. The patterned resist of claim 18, wherein the resist is a negative resist.

25. An ink jet print head comprising at least one patterned resist according to claim 18.

10 26. A micro electro-mechanical system comprising at least one patterned resist according to claim 18.

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